REMARKS

Claims 1-2 are pending in the Application. Applicant requests reconsideration and allowance of the Application in view of the following remarks.

Initially, Applicant wishes to thank Examiner Vo and her supervisor, Examiner Morris, for the interview conducted April 9, 2003. This Request for Reconsideration is being submitted pursuant to Examiner Morris' suggestion.

In the first Office Action, Examiner Vo indicated that Karande, the primary reference on which she is relying, "is silent as to the thickness of the reinforcing particles." In the outstanding Office Action, however, the Examiner now asserts that "the limitations 'more than about 50% [of the nanoparticles] are less than about 20 layers thick and more than about 99% are less than about 30 layers thick' have been disclosed by Karande," which, according to Examiner Vo, teaches in the abstract a polymer foam prepared by dispersing an organophilic multi-layered material into a melt of polyolefin. That is not, in fact, taught in the prior art; in fact, as explained more fully below, the prior art can actually be viewed as teaching away from the claimed invention.

As became clear during the interview, Examiner Vo has greatly extrapolated the statement in the Karande abstract that "the organophilic multi-layered material can also be dispersed into an olefinic or styrenic monomer, which can then be polymerized to form a polymer melt prior to, or along with the foaming step" to be a disclosure of the specific, claim-recited limitations. As Examiner Vo explained, if, for example, 100% of the Karande particles were made up of two layers, that would satisfy the distribution limitation that more than about 50% of the reinforcing particles are less than about 20 layers thick and more than about 99% of the reinforcing particles are less than about 30 layers thick. The operative word there, however, is "if". In other words, the Examiner has completely hypothesized a disclosure in Karande which simply isn't there. A rejection predicated on such a hypothesized disclosure is completely improper and unfounded and therefore must be withdrawn.

Moreover, the Office Action asserts that Karande discloses that the particles comprise 3% by weight and a blowing agent comprising about 3% by weight. As Applicant's representative explained during the interview, however, that disclosure of 3% by weight does

not necessarily satisfy the requirement that the particles constitute about 2% to about 15% by volume. As explained during the interview, the volume percentage corresponding to the 3% by weight in Karande will depend on the densities of the particles and the polymer in which the particles are dispersed.[1]

As further discussed during the interview, Examiner Vo's asserted justification for varying the distribution of the reinforcing particles of different thicknesses in the polymer matrix, which specific combination Examiner Vo admitted in the previous Office Action is not disclosed or taught by the combination of cited references, improperly utilizes Applicant's own teaching to do so. In particular, the previous Office Action asserts that "such a feature would have been recognized by one skilled in the art as a result effective variable to control the degree of viscosity and reinforcing effect of the particles such that the too many thicker particles [sic] produce a viscosity high enough to make the handling and mixing of the product more difficult whereas too many thinner particles leads to a reduction of mechanical strength and impact resistance." That is precisely why Applicant teaches that the specific combination of features be employed. See, for example, page 6, lines 1-4 of the Application ("if too many particles have an aspect ratio above 300, the material becomes too viscous for forming parts in an effective and efficient manner[;] if too many particles have an aspect ratio of smaller than 50, the particle reinforcements will not provide the desired reinforcement characteristics"); page 8, line 17-20 ("if greater than 15% by volume of reinforcement filler is used, the viscosity of the composition becomes too high and thus difficult to mold[;] preferably, the amount of reinforcing nanoparticles is greater than 2% by volume (as lower amounts would not achieve the desired increase in strength) and less than 15%"); and page 8, lines 3-5 ("inclusion of more than 10% nanoparticles tends to increase the viscosity of the composition to .[sic] which impairs injection molding"). As Examiner Morris acknowledged, relying on Applicant's own teaching as justification for a combination of or modification to references is improper and is quintessentially hindsight-based. If Examiner Vo wishes to

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[1] During the interview, Applicant's representative provided the examples of a one cubic inch piece of cork and a one cubic inch piece of lead immersed within a gallon of water. If the piece of cork weighs one-half ounce, it will constitute 0.39% by weight of the dispersion and 4.3% by volume of the dispersion (a gallon of water weighing eight pounds and occupying two hundred thirty-one cubic inches). A cubic inch of lead, on the other hand, will constitute the same volume percentage but, assuming it weighs half a pound, will constitute 6.25% by weight of the dispersion.

maintain the asserted position, it is incumbent upon her to provide some teaching other than Applicant's own teaching to support her position.

Furthermore, as noted above, the present invention is not taught in the prior art and, in fact, the prior art can actually be viewed as teaching away from the present invention. In particular, the instant application teaches on page 8, lines 1-6, that the exfoliation (delamination and dispersion) of the layered mineral particles into constituent layers does not need to be complete:

> The exfoliation of layered mineral particles into constituent layers need not be complete in order to achieve the objects of the present invention. The present invention contemplates that at least 99% of the particles should be less than about 30 nanometers (30 layers or platelets) in thickness, and that more than about 50% of the particles should be less than about 20 nanometers (20 layers or platelets) in the thickness direction.

Therefore, the claims of the instant application that "each of said reinforcing particles having one or more layers of 0.7nm-1.2nm thick platelets, wherein more than about 50% of the reinforcing particles are less than about 20 layers thick, and wherein more than about 99% of the reinforcing particles are less than about 30 layers thick."

Okada et al. (U.S. Patent No. 4,739,007) disclose at column 2, lines 40-45 and at column 3, lines 37-43 that "the composite materials according to another aspect of this invention comprise a polymer matrix containing polyamide and layers of a silicate uniformly dispersed in the order of magnitude of molecular dimensions in said polymer matrix, each of said silicate layers being 7 to 12 Å thick, the interlayer distance being at least 20 Å."

Christiani et al. (U.S. Patent No. 5,747,560) teach at column 21, lines 58-66, that delamination is important for their invention to work. They expressly state that the particles have to be less than about 10 layers thick and preferably less than 5 layers thick in order to achieve enhanced properties with these nanodispersed fillers over conventional micro-scale fillers (emphasis added):

> In cases where intercalation is incomplete between some layers, those layers will not delaminate in the polymer melt, and will form platelet particles comprising those layers in a coplanar aggregate. These latter platelet particles still constitute nanoscale and nanodispersed fillers and provide enhanced properties over and above those provided by conventional micro-scale fillers, as long as they are less than about 10 layers thick and preferably less than 5 layers thick.

Christiani et al. accordingly provide a detailed description on how to further facilitate delamination of layered materials into platelet particles and to prevent reaggregation of the particles by intercalation with swelling/compatibilizing agents. Christiani et al. assert that compatibilization will lead to an improved dispersion of the platelet particles in the matrix and an improved percentage of delaminated platelets with a thickness of less than 50 Å.

In view of this, the prior art references may actually be viewed as teaching away from the instant invention, according to which it was found that exfoliation of the layered mineral particles into constituent layers does not need to be complete. Applicant submits, therefore, that the present invention would not have been obvious in view of the teachings of the prior art and that the present invention represents far more than just a mere determination of optimum or workable ranges involving only routine skill in the art.

In view of the foregoing, Applicant traverses the rejection and respectfully requests that it be withdrawn. Timely and favorable reconsideration and Notice of Allowance are respectfully requested.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached Appendix is captioned **"Version with markings to show changes made"**.

Respectfully submitted,

Pillsbury Winthrop LLP

By: _____

Kenneth M. Fagin
Reg. No.: 37,615
Tel. No.: (703) 905-2066
Fax No.: (703) 905-2500

KMF:emg
P.O. Box 10500
McLean, VA 22102
(703) 905-2000
Enclosure: Appendix

APPENDIX

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

Page 1, before line 1, please insert the following header and paragraph:

Governmental Support and Interest:

The invention in this patent was made with Governmental support under Cooperative Agreement No. 70NANB7H3028 awarded to the Dow Chemical Company and Decoma International of America, Inc. (formerly Magna International of America, Inc.), project ID 199-02-0047B, project name "NANOCOMPOSITES – NEW LOW COST/HIGH STRENGTH MATERIALS FOR AUTOMOTIVE PARTS," awarded September 30, 1997 by the United States Department of Commerce, National Institute of Standards and Technology, Advanced Technology Program. The Government has certain rights in this invention.